

# Town of Lancaster, Massachusetts

## Environmental Overlay District Pilot Project

### 7.0 Stormwater BMP Restoration and Offset Locations

One piece of balancing the hydrologic cycle is offsetting water supply withdrawals and wastewater discharges. Offsets are a means to keep the water within the study area by reducing or replacing what is taken from surface and groundwaters. Massachusetts Department of Environmental Protection (DEP) through its Water Management Act Program is in the process of requiring water suppliers and wastewater dischargers to 'offset' their withdrawal and discharge increases, but the types and amounts of potential offsets have not been established. This section addresses some potential offsets found in Lancaster.<sup>1</sup>

#### 7.1 Defining Offsets

Prioritization of the offsets identified here considers the ability of the existing stormwater practices to provide infiltration and groundwater recharge, amount of impervious surface, proximity to Lancaster's water supply aquifer, underlying soils, land use within the drainage area, and the condition and amount of impervious surfaces. Potential offset categories and criteria included:

##### **A Demand Management Offsets**

- 1 Comprehensive water audits
- 2 Metering and upgrades to billing programs
- 3 Low Impact Development (LID) measures
- 4 Landscape design improvements that increase organic matter in soils and require adequate topsoil (to reduce irrigation demands)
- 5 Plumbing code improvements
- 6 Indoor water conservation programs
- 7 Facilities improvements such as LEED certification
- 8 Leak detection (note that this requires repeating and is not a permanent offset so it should not get a 1:1 offset)
- 9 Xeriscape landscaping or reduction of cleared area to reduce irrigation demands
- 10 Conversion of wet ponds for irrigation use to offset use of finished drinking water for irrigation
- 11 Use of cisterns or other storage for irrigation

##### **B Withdrawal Offsets**

- 1 Stormwater performance criteria that call for greater recharge amounts, on a widespread basis, by providing regulatory changes that affect new and redevelopment (e.g., the stormwater overlay recommended in this report)
- 2 Infiltration of roof leaders to groundwater
- 3 Detention or retention basin conversions to infiltration basins with pretreatment

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<sup>1</sup> Note that the limited development in Lancaster resulted in limited offsets since they tend to be development related.



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- 4 Retrofit of parking lots, road corridors and other impervious areas with storage and infiltration features instead of offsite piping of all runoff (see Table 7-1 and Figure 7-1 at the end of the report for a matrix of Lancaster sites)
- 5 Use of pumped storage facilities such as bermed reservoirs (as opposed to dammed streams) for flood skimming of increased runoff volumes from developments<sup>2</sup>
- 6 Aquifer storage projects that mound groundwater as storage

### **C Environmental Offsets**

- 1 Extended detention of less than one year storms for channel protection (since this essentially offsets withdrawals from the aquifer)
- 2 Soil filtration treatment of stormwater discharges for fisheries protection (since this also delays and cools runoff, mimicking baseflow discharges from groundwater)

### **7.2 Existing Offsets**

To help manage water withdrawals, the Town of Lancaster recently adopted an Outdoor Water Use Bylaw to restrict or prohibit water use as necessary to protect the Town's water supply. Restrictions include limiting outdoor watering to daily periods and particular days of the weeks, while prohibited water uses include filling swimming pools and use of automatic irrigation sprinklers.

### **7.3 Offset Sites Matrix Evaluation**

In addition to the general categories listed in section 7.1 above, a number of specific sites in Lancaster were evaluated for offset potential. Each of the sites was evaluated using specific criteria and a point system associated with each of the criteria. The sum of points provided a ranking of sites, with the highest points representing the highest priority and the lowest points representing the lowest priority. The criteria used in the evaluation are outlined below.

Existing Stormwater BMPs. Field investigations were conducted throughout the Town of Lancaster to identify existing stormwater drainage systems, which collect and direct runoff to BMPs providing some form of detention (e.g., ponds and swales). Closed drainage systems were primarily found on commercial and institutional properties. Systems that could potentially be retrofitted to provide recharge received points.

Potential Impervious Area for Water Offset. Measurements of the impervious surfaces for restoration and offset locations were calculated using an ortho image of Lancaster.

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<sup>2</sup> Pumped storage facilities are usually reservoirs that do not dam streams or rivers, but are instead filled when high flows occur and water is diverted and pumped to the storage reservoir. These reservoirs can capture some of the excess runoff that occurs with development as evapotranspiration is released as clearing occurs. These systems can help provide a balance that maintains a more natural flow regime while storing excess flows for human or low flow release purposes. These reservoirs may also increase in viability as climate change results in high intensity events followed by droughts in some areas.



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Parking lots and building areas were identified and delineated using GIS software. Points were assessed based on the amount of impervious area and associated runoff that could potentially be collected for stormwater offset.

Recharge to Aquifer. Restoration and offset locations were mapped for comparison to the aquifer areas in Lancaster. An aquifer base map was used to identify which locations fell within an aquifer area. Due to the importance for recharging the Town's water supply aquifers, opportunities for stormwater infiltration BMPs in aquifer areas rated higher than in other areas.

Soils. USGS soil information was reviewed for each of the potential restoration and offset locations to determine if stormwater infiltration is feasible. Type A and B soils are considered more adequate for providing the desired infiltration rate required to recharge stormwater in a reasonable period of time. Type C and D soils provide lower infiltration rates and may not meet the desired criteria for stormwater infiltration designs. Prioritization points are based on the hydrologic soils group identified at each restoration and offset location. Soils with high infiltration rates received more points than those with low infiltration rates.

Land Use. Concerns for potential pollutant loads were evaluated during field investigations. Although stormwater practices can be designed to remove most targeted pollutants, recharging stormwater with certain mobile, volatile pollutants is not usually appropriate. Land uses that generate contaminants associated with stormwater pollution were noted and points are prioritized according to the pollutant categories (e.g., oil, nutrients and sediment).

Impervious Surfaces. Roof leaders from buildings located at each location were noted to determine those that are not now but might be infiltrated. Conditions of impervious surfaces (parking lots and road surfaces) were evaluated for integrity and condition, in that retrofits of parking lots may be less expensive if the lot needs paving anyway.

Table 7-1 and Figure 7-1 show the twenty-five potential restoration and offset locations within Lancaster and their ranking based on the point system described above.



**Table 7-1**  
**Restoration and Offset Site Decision Matrix**

Site		Potential Impervious Area for Water Offset (acres)	Points: Potential Impervious Area for Water Offset (acres)	Recharge to Aquifer	Points: Recharge to Aquifer	Hydrologic Soil Group	Points: Hydrologic Soil Group	Contamination Potential	Points: Contamination Potential	Condition of Asphalt	Points: Condition of Asphalt	Sum of Ranking Criteria	Comments
1	6-DIVISION OF YOUTH SERVICE Prison	41.0	4	No	0	A	3	Low potential	2	Good	0	9	Large prison buildings surrounded by grass/fields/woods No stormwater BMPs observed
2	5-26 Rockport Shoes (101-104)	11.0	3	No	0	A	3	Low potential	2	Good	0	8	Heavy sand built up in parking lot, drainage system appears to end at leaching CBs
3	3-2 Showboat Theater (11-26)	2.5	1	No	0	C	1	Low potential	2	Good	0	4	Very large parking lot. Some sand built up at lower end No drainage structures No stormwater BMPs observed
4	4-ROUTE 2 Visitors Center (1-8)	2.0	1	No	0	A, D	3	Sediment, oil and grease	0	Good	0	4	Heavy sand buildup in parking lot Trash collected at CBs No stormwater BMPs observed
5	4-10A Boy Scouts	0.5	1	Yes	2	A	3	Low potential	2	Good	0	8	Small parking lot No drainage structures No stormwater BMPs observed
6	3-3 D'Ambrosio Eye Care (105-107)	1.0	1	No	0	A	3	Low potential	2	Good	0	6	Parking lot was clean Hooded catch basins Large detention pond (dry) with outlet control structure to allow infiltration
7	4-11 Lancaster Golf (108-115)	1.0	1	No	0	A, C, D	3	Low potential	2	Good	0	6	Grass Swale Small amount of sand built up No stormwater BMPs observed before discharging to swale
8	9-9B Toyota Car Dealer	4.0	1	Yes	2	B, C	2	Sediment	2	Good	0	7	Large detention pond/forebay Grassed swale Small amount of sand Some bank erosion off edge of pavement
9	14-4 Insurance Auto Auction (91-96)	2.0	1	Yes	2	Mix: A, B, C , D	3	Automotive chemicals	0	Good	0	6	Large parking lot with new leaching catch basins Cars are delivered to site for wholesale auction Area where cars are stored is primarily dirt
10	24-2 Route 117 Used Auto Parts (junked cars)	0.5	1	No	0	C, D	1	Oil/Grease	0	Good	0	2	Small parking lot in front of office building No stormwater BMPs observed
11	24-74 Nursery	1.0	1	No	0	C	1	Fertilizer/Nutrients	0	N/A	0	2	Mostly pervious surface, small paved area at entrance and one main building Trees are B&B and plants are in containers No stormwater BMPs observed

**Table 7-1**  
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12	24-65 River Terrace Health Care	1.5	1	No	0	C	1	Sediment	2	Fair	1	5	Large amount of sand built up in a small parking lot No stormwater BMPs observed
13	26-1, 26-2, 26-3, 31-3, 31-4, Sand Pit Mining Operation (85-89) (Lot 26-2 is Town owned)	0.0	1	Yes	2	A	3	Low potential	2	N/A	0	8	Open Space Trees are beginning to reclaim old mined areas Grass/sod has been planted in some areas
14	30-154 Mary Rowlandson Elementary School/ Luther Burbank Middle School (76-78)	5.0	2	No	0	B	2	Low potential	2	Good	0	6	Large parking lot with hooded catch basins Ball fields off back of property
15	Lancaster Fire Station	1.5	1	No	0	C, D	1	Low potential	2	Good	0	4	Small detention pond in front of station (dry) Collects sheet flow from the driveway/parking
16	34-132 Franklin Perkins School (79-84)	5.0	2	No	0	C	1	Low potential	2	Good	0	5	School facility with large lawn area Several parking areas and driveway winds through site Closed drainage system along driveway, leaching basins along building, roof leaders into dry wells
17	34-91 Town Hall (27-45)	4.0	1	No	0	C, Quarry	1	Sediment	2	Fair	1	5	Sand in parking lot Some roof leaders discharge to dry wells Closed drainage system discharges to grass adjacent to wetland area
18	37-10 & 37-10B Horse Farm (73-75)	1.0	1	No	0	C	1	Low potential	2	N/A	0	4	Mostly pervious surface with woods buffer Runoff from fields sheets into wooded area and swale along Langen Road
19	Atlantic Union College (71-72)	17.0	3	Yes/No	2	A	3	Low potential	2	Fair/Poor	2	12	Several small parking lots with sand built up Closed drainage systems look pretty old Roof leaders into dry wells
20	39-4 220 Old Common Road (56-70) Division of Capital Asset Management (DCAM) Children's Action Corps	8.0	2	Yes	2	A	3	Sediment	2	Fair/Poor	2	11	Several small parking lots with sand built up Little closed drainage system, some hooded catch basins Large lawn/field areas available for BMPs
21	41-236 South Lancaster Commercial Area (primarily behind auto body shop) (46-51)	8.0	2	Yes	2	Mix: A, C and Quarry	3	Low potential	2	Good	0	9	Large paved area behind auto body shop Drain pipe running below RxR tracks and paved area Impervious area was clean and looked like it gets very little use No stormwater BMPs observed
22	42-19 Pack and Post (52-55)	0.5	1	Yes	2	B	2	Sediment	2	Good	0	7	Sand in parking lot Drainage system discharges to a swale and small wetland area

**Ranking Point System:**

Impervious Area for Offset: 0-4 acres = 1, 5-9 acres = 2, 10-20 acres = 3, >20 acres = 4

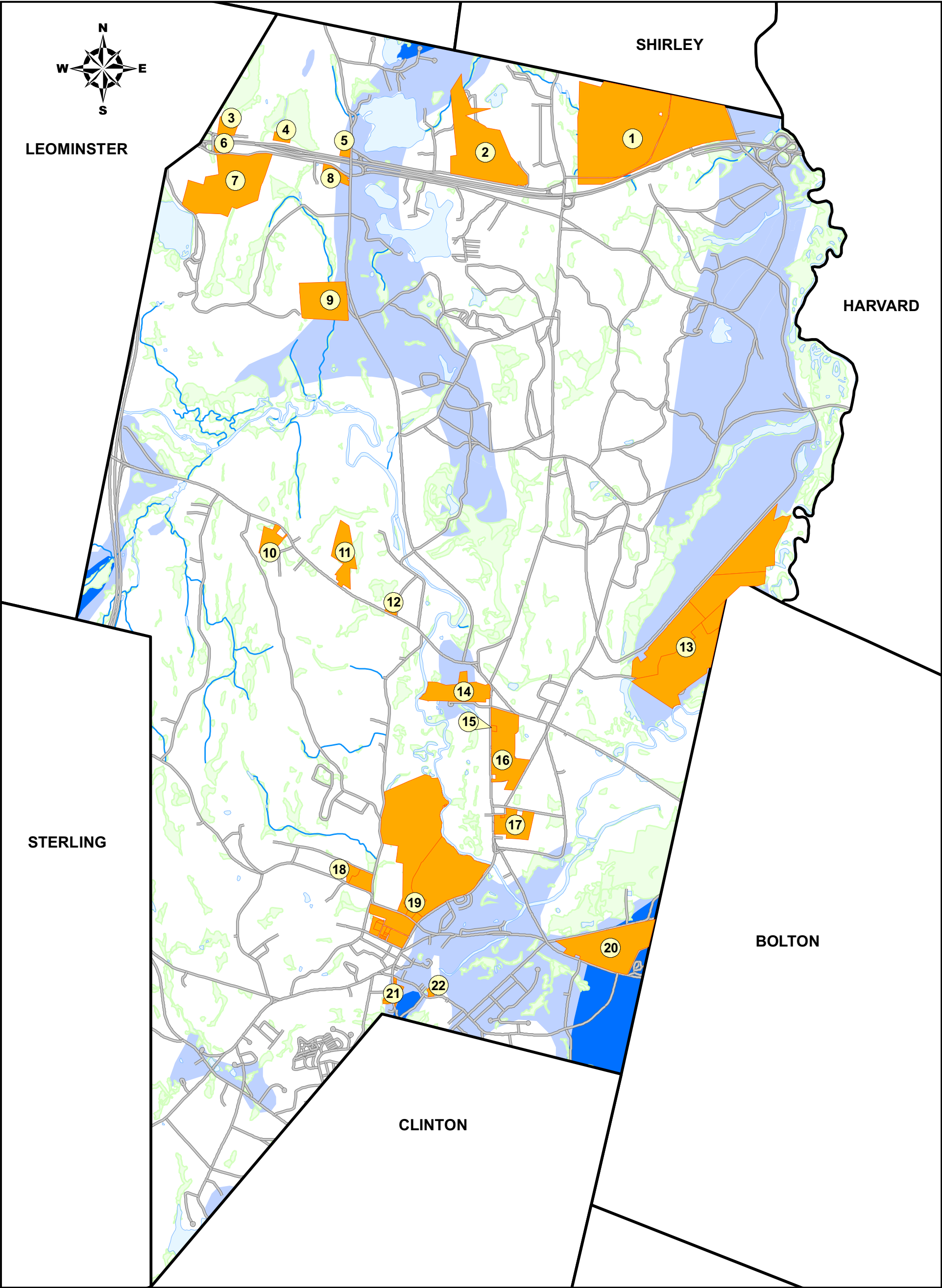
Aquifer Recharge: Yes=2, No=0 (Sites within medium and high yield aquifers received 2 points)

Hydrologic Soil Group: A=3, B=2, C=1, D=0







Contamination Potential: Yes=0, No=2

Asphalt Condition : Good=0, Fair=1, Poor=2 (Asphalt condition was based on surface conditions, whether crack had formed and if resurfacing could be required in the near future)





**LEGEND**

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|  Restoration and Offset Sites | <b>Hydrography</b>  |
| <b>Aquifer Yield (Gallons per Minute)</b>  |  Lake, Pond    |
|  100-300                      |  DEP Wetlands  |
|  >300                         |  Stream, Brook |

Data Sources: Town of Lancaster, MassGIS, MADEP

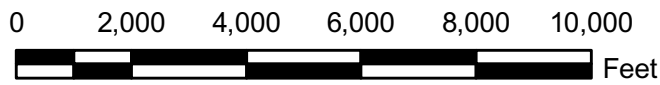


Figure 7-1  
**Restoration and Offset  
Locations**  
Lancaster, MA



**Comprehensive Environmental Inc.**